least two wavelengths in said diffractive grating portion is m (integer) times the wavelength, and values of m in the two wavelengths are the same.

REMARKS

In view of the above amendments and the following remarks, Applicant requests favorable reconsideration and allowance of the above-identified application.

Claims 1-7 and 9-22 remain pending in this application, with Claims 1-7, 9-12 and 20-22 being independent. By this Amendment, Applicant has amended Claims 13 and 18-20. No new matter has been added.

Claims 18 and 19 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Applicant has amended the claims to attend to the matters noted in Office Action as giving rise to this rejection. Accordingly, Applicant requests withdrawal of the § 112 rejection.

Claims 1, 11, 12 and 13-22 stand rejected under 35 U.S.C. § 103 over U.S. Patent No. 6,157,488 (Ishii). Claims 2-7, 9, 10 and 13-19 stand rejected under 35 U.S.C. § 103 over the Ishii patent in view of U.S. Patent No. 5,279,924 (Sakai, et al.). Applicant traverses these rejections.

As recited in independent Claims 1, 2, 4, 5, 9, 11, 12 and 20-22, Applicant's invention is directed to a diffractive optical element including diffractive gratings differing in dispersion from each other and having a space layer of a diffractive index of 1.

The diffractive optical element described in the Ishii patent has a stack of three optical regions. The Office Action states that providing the second optical region

with a diffractive index of 1 would be obvious to one of ordinary skill in the art, even though the Ishii patent does not include any such disclosure or suggestion.

Applicant submits that the Ishii patent presupposes that the diffractive optical grating is formed with a combination of polycarbonate and a material of a low refractive index and low dispersion, and not with a second region having a diffractive index of 1, such as air. Specifically, the patent states that, in order to reduce wavelength dependency of diffraction efficiency, $\Delta N(\lambda)$ is increased with the increase of the wavelength. To achieve this, one of ordinary skill in the art would be motivated to use a combination of polycarbonate and a material of low diffractive index and low dispersion for the second optical region. Such a structure would be impossible to realize if the second optical region were to have a refractive index of 1.

Accordingly, Applicant submits that the modification of the element described in the Ishii patent is contrary to and unworkable in the system described in the Ishii patent. Applicant notes that, for a proper obviousness-type rejection, the proposed modification of the prior art cannot render the device unsatisfactory, which Applicant submits the proposed modification in the present Office Action would do. *See In re Gordon,* 733 F.2d 900, 221, USPQ 1125 (Fed. Cir. 1984); *see also* MPEP 2143.01.

In addition, with the present invention, the ratio of light blocked with side edges of the diffractive gratings can be lowered because the heights of a pair of diffractive gratings facing a space of a refractive index of 1 can be lowered. As a result, diffraction efficiency is elevated and factors such as color flare can be reduced. Such an advantage is not addressed in the Ishii patent, and moreover, would be absent without the claimed space with a refractive index of 1. Also, with the space of a refractive index of 1 being provided

between two diffractive gratings, the diffractive gratings do not need to be provided on the surface of the element, reducing the possibility for dust to adhere thereto. In the element described in the Ishii patent, three layers are stacked together, making such an arrangement unworkable.

These problems are not remedied by the Sakai, et al. patent, which is merely cited as describing chamfering peak and valley portions of diffraction gratings.

Accordingly, Applicant submits that the Ishii and Sakai, et al. patents, taken alone or in combination, fail to disclose or suggest at least the features of diffractive grating layers differing in dispersion from each other and having a space layer of a refractive index of 1, as recited in Claims 1, 2, 4, 5, 9, 11, 12 and 20-22.

As recited in independent Claims 3, 6, 7 and 10, Applicant's invention is directed to a diffractive optical element including a pair of diffractive gratings differing in dispersion from each other. The maximum optical path length difference occurring in the pair of diffractive gratings with respect to each of at least two wavelengths is m (integer) times the wavelength and the values of m in the two wavelengths are the same, with peak and valley portions of the pair of diffractive gratings being formed in a chamfered shape.

Applicant notes that the Sakai, et al. patent is directed to a method of manufacturing an optical diffraction grating that "possesses a high diffraction deficiency" (column 6, lines 35 and 36). Applicant submits that such a diffraction deficiency is due to the fact that the diffracting grating is formed to have a blazed configuration. Applicant does not understand the Sakai, et al. patent to describe the effect of curved surface 20 on diffraction deficiency. In other words, that document fails to describe improving

diffraction efficiency by forming peak or valley portions of a diffractive grating into a chamfered shape.

Accordingly, Applicant also submits that the Ishii and Sakai, et al. patents, taken alone or in combination, fail to disclose or suggest at least the features of a pair diffractive gratings differing in dispersion from each other and confronting each other, wherein a maximum optical path length difference occurring in light passing through the pair of diffractive gratings with respect to at least two wavelengths is m (integer) times the wavelength, and the values of m in the two wavelengths are the same, with peak portions and valley portions of the pair of diffractive gratings being formed in a chamfered shape, as recited in independent Claims 3, 6, 7 and 10.

For the foregoing reasons, Applicant submits that the independent claims are distinguishable over the applied patents, and requests withdrawal of the rejections under 35 U.S.C. § 103.

The remaining claims in the present application are dependent claims which depend from the independent claims discussed above, and thus are patentable over the applied documents for the reasons noted above with respect to those independent claims. Further, each recites features of the invention still further distinguishing it from the applied documents. Therefore, Applicant requests favorable and independent consideration thereof.

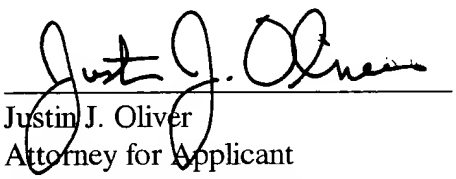
This Amendment After Final Rejection is an earnest attempt to advance prosecution and is believed to clearly place this application in condition for allowance. At the very least, the Amendment reduces the number of issues on appeal. This Amendment was not earlier presented because Applicant earnestly believed that the prior Amendment

placed the subject application in condition for allowance. Accordingly, Applicant respectfully requests entry of this Amendment under 37 C.F.R. § 1.116.

Applicant believes that all outstanding matters in this application have been attended to, and that the application is in condition for allowance. Accordingly, Applicant requests a notice thereof.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,



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VERSIONS WITH MARKINGS TO SHOW
CHANGES MADE TO THE CLAIMS

13. (Amended) An optical system, comprising:

a diffractive optical element according to one of claims 1 to 7 and 9 to 12; and

a lens [systems] system.

18. (Amended) An optical system, comprising: a diffractive optical element according to any one of claims 2-7, 9, and 10 [and 20-22]; and

a lens system,

wherein each of said pair of diffractive gratings comprises a flat surface, and a length a of said flat surface in a direction of grating arrangement of each diffractive grating is $0.5\ \mu m < a < 2\ \mu m$.

19. (Amended) An optical system, comprising:

a diffractive optical element according to any one of claims 2-7, 9, and 10 [and 20-22]; and

a lens system,wherein each of said pair of diffractive gratings comprises a curved surface, and a radius of curvature r of said curved surface on a cross sectional plane

including a direction of grating arrangement of each diffractive grating is 0.5 μm < r < 2 μm.

20. (Amended) A diffractive optical element, comprising:

a diffractive grating portion having a plurality of diffractive grating layers laminated with a space layer of refractive index of 1, said plurality of diffractive grating layers differing in dispersion from each other,

wherein a maximum optical path length difference occurring with respect to at least two wavelengths in said diffractive grating portion is m (integer) times the wavelength, and values of m in the two wavelengths are the same.